

DEPARTMENT OF ECONOMICS

Economics is a broad field that aims to understand why the world works as it does and how government and other interventions might affect wellbeing. The field is diverse methodologically, encompassing mathematical modeling, data science, and randomized trials as appropriate. It interacts both with other social sciences, as with political science and psychology in the attempt to better understand government and individual behavior, and with the sciences, as with statistics and computer science in developing data analysis techniques.

Economics studies decision-making at the individual level and the aggregate outcomes that result when individuals, firms, institutions and governments interact. It remains concerned with classic topics, such as the causes of business cycles, the effects of industry regulations, and the consequences of tax policies, but also focuses on the diverse social challenges of the developed and developing world: poverty, education, health, the environment, and inequality.

The Department of Economics offers subjects at multiple levels in the three core areas of the discipline—microeconomic theory, macroeconomics, and econometrics—and specialized subjects in many applied fields, including development economics, environmental economics, health economics, industrial organization, international trade, labor economics, political economy, and public finance.

The department offers several undergraduate programs that prepare students for careers in business, finance, consulting, law and public policy, and for further study. Its doctoral program is frequently ranked as the best in the world.

Undergraduate Study

Bachelor of Science in Economics (Course 14-1)

Course 14-1, leading to the Bachelor of Science in Economics (<http://catalog.mit.edu/degree-charts/economics-course-14>), provides students with a breadth and depth of training in economics that is unusual at the undergraduate level. It combines training in technical economics with in-depth exploration of students' areas of interest. Students choose from a diverse set of upper level undergraduate subjects and are encouraged to engage in independent research.

The aims of the SB in Economics degree program are threefold: to give students a firm grounding in economic theory and data analysis, to develop in-depth knowledge of particular economic issues, and to develop students' capabilities for independent research. These aims correspond roughly to the requirements in the Course 14-1 program of theory, statistics and econometrics, electives, and research.

The requirements allow substantial freedom for students in designing individual programs within economics, and in balancing the program with subjects in other disciplines. The ample elective

slots let students apply their technical skills to develop a deep understanding of whatever interests them, whether that is poverty in developing countries, international trade, game theory, for example. The department recommends that students interested in graduate work in economics build their technical skills with additional subjects in mathematics and computer science. Students can also complement their studies in the major with subjects in political science, history, and other social sciences.

The major is sufficiently flexible that students can transfer into the major or add it as a second major without having taken courses beyond 14.01 Principles of Microeconomics and 14.02 Principles of Macroeconomics in the first two years. Students typically complete an intermediate micro subject, 14.05 Intermediate Macroeconomics, 14.30 Introduction to Statistical Methods in Economics, and 14.32 Econometric Data Science by the third year. This satisfies the prerequisites for all subjects (including 14.33 Research and Communication in Economics: Topics, Methods, and Implementation) and prepares students for research on their thesis and in other elective subjects.

Bachelor of Science in Mathematical Economics (Course 14-2)

The SB in Mathematical Economics (<http://catalog.mit.edu/degree-charts/mathematical-economics-course-14-2>) is designed for students who desire a deeper mathematical foundation, and allows them to concentrate in a subset of economics topics. This program is well suited to students interested in mathematical microeconomic theory or econometrics. Students will gain the strong mathematical and theoretical preparation needed for subsequent graduate study in economics.

Students majoring in Mathematical Economics start with the same introductory micro and macro courses as 14-1 majors. They go on to take a program that includes rigorous mathematical training in microeconomic theory and econometrics, and substantial coursework in mathematics, including 18.100x Real Analysis, a choice between 18.06 Linear Algebra or 18.03 Differential Equations, and at least one mathematics seminar.

Bachelor of Science in Computer Science, Economics, and Data Science (Course 6-14)

The Department of Electrical Engineering and Computer Science (<http://catalog.mit.edu/schools/engineering/electrical-engineering-computer-science>) and the Department of Economics (p. 3) offer a joint curriculum leading to a Bachelor of Science in Computer Science, Economics and Data Science (Course 6-14) (<http://catalog.mit.edu/degree-charts/computer-science-economics-data-science-course-6-14>). The interdisciplinary major provides students a portfolio of skills in economics, computing, and data science that are increasingly valued in both the business world and academia. The economics and computer science disciplines have a substantial overlap both in their reliance on game theory and mathematical modeling techniques and their use of data analytics. The economics side of the program

includes subjects in microeconomic theory and econometrics and electives that expose students to how economists in various fields use mathematical models and statistical evidence to think about problems. The computer science side includes a number of subjects that develop complementary knowledge, including the study of algorithms, optimization, and machine learning (which is increasingly integrated with econometrics). The program also includes coursework in several mathematical subjects, including linear algebra, probability, discrete mathematics, and statistics, which can be taken in various departments.

The Course 6-14 major is also well suited to students whose primary interest is in game theory and mathematical modeling. It can prepare students for graduate study in either discipline.

Minor in Economics

The objective of the minor is to extend the understanding of economic issues beyond the level of the concentration. This is done through specialized analytical subjects and elective subjects that provide an extensive treatment of economic issues in particular areas.

The Minor in Economics consists of six subjects arranged into three levels of study:

Tier I		
14.01	Principles of Microeconomics ¹	12
14.02	Principles of Macroeconomics ¹	12
14.30	Introduction to Statistical Methods in Economics	12
or 18.05	Introduction to Probability and Statistics	
Tier II		
Select one of the following:		12
14.03	Microeconomic Theory and Public Policy	
14.04	Intermediate Microeconomic Theory	
14.05	Intermediate Macroeconomics	
Tier III		
Select two elective subjects in applied economics. ²		24
Total Units		72

¹ Under no circumstances may a student complete a minor with fewer than six subjects. Any student who receives permission from the Economics Department to skip 14.01 and/or 14.02 in order to take a higher-level subject must take a replacement subject for each subject that is skipped.

² See the department's website for a list of available subjects (<http://economics.mit.edu/under/minors>).

Inquiries

For more information regarding admissions or financial aid (evako@mit.edu), contact Julia Martyn-Shah, 617-253-8787. For undergraduate admissions and academic programs (gking@mit.edu), contact Gary King, 617-253-0951. For any

other information, (memiller@mit.edu) contact Megan Miller, 617-253-3807.

Graduate Study

Admission Requirements for Graduate Study

The Department of Economics specifies the following prerequisites for graduate study in economics: one full year of college mathematics and an appreciable number of professional subjects in economics for those qualified students who have majored in fields other than economics. Applicants for admission who have deficiencies in entrance requirements should consult with the department about programs to remedy such deficits.

Master of Science in Economics

In unusual circumstances, admission may be granted to current MIT students seeking the Master of Science degree. The general requirements for the SM (<http://catalog.mit.edu/mit/graduate-education/general-degree-requirements/#mastersdegreertext>) are given in the section on Graduate Education.

Master of Applied Science in Data, Economics, and Development Policy

The Master of Applied Science in Data, Economics, and Development Policy (<http://catalog.mit.edu/degree-charts/master-applied-data-economics-development-policy>) is an intensive program consisting of a series of nine subjects plus a capstone experience (a summer internship and a corresponding project report). Students will gain a strong foundation in microeconomics, development economics, probability, and statistics; engage with cutting-edge research; and develop practical skills in data analysis and the evaluation of social programs. Only students who have successfully completed the MITx MicroMasters (<https://micromasters.mit.edu/dedp>) credential in Data, Economics and Development are eligible to apply to the on-campus Master's program.

Email for more information (dedp_masters@povertyactionlab.org) or visit the website (<https://economics.mit.edu/masters>).

Master of Engineering in Computer Science, Economics, and Data Science

The Department of Electrical Engineering and Computer Science and the Department of Economics offer a joint curriculum leading to a Master of Engineering in Computer Science, Economics, and Data Science. Computer science and data science provide tools for problem solving, and economics applies those tools to domains where there is rapidly growing intellectual, scholarly, and commercial interest, such as online markets, crowdsourcing platforms, spectrum auctions, financial platforms, crypto currencies, and large-scale matching/allocation systems such as kidney donation and public school choice systems. This joint program prepares students for jobs in economics, management consulting, and finance. Students in the program are full members of both

departments, with a single advisor chosen from EECS or Economics based on interests of the student as well as the advisor's interest and expertise in the 6-14 area.

The Master's of Engineering in Computer Science, Economics, and Data Science (Course 6-14P) builds on the foundation provided by the Bachelor of Science in Computer Science, Economics, and Data Science (Course 6-14) to provide both advanced classwork and master's-level thesis work. The student selects (with departmental review and approval) 42 units of advanced graduate subjects, which include two subjects in economics and two subjects in electrical engineering and computer science. A further 24 units of electives are chosen from a restricted departmental list of math electives.

The Master of Engineering degree also requires 24 units of thesis credit. While a student may register for more than this number of thesis units, only 24 units count toward the degree requirement.

Programs leading to the five-year Master of Engineering degree or to the four-year Bachelor of Science degree can be arranged to be identical through the junior year. At the end of the junior year, students with a strong academic record will be offered the opportunity to continue through the five-year master's program. A student in the Master of Engineering program must be registered as a graduate student for at least one regular (non-summer) term. To remain in the program and to receive the Master of Engineering degree, students will be expected to maintain a strong academic record. Admission to the Master of Engineering program is open only to undergraduate students who have completed their junior year in the Course 6-14 Bachelor of Science program.

Financial Support

The fifth year of study toward the Master of Engineering degree can be supported by a combination of personal funds, a fellowship, or a graduate assistantship. Assistantships require participation in research or teaching in the department or in one of the associated laboratories. Full-time assistants may register for no more than two scheduled classroom or laboratory subjects during the term, but may receive academic credit for their participation in the teaching or research program. Support through an assistantship may extend the period required to complete the Master of Engineering program by an additional term or two. Support is granted competitively to graduate students and will not be available for all of those admitted to the Master of Engineering program. If provided, department support for Master of Engineering candidates is normally limited to the first three terms as a graduate student unless the Master of Engineering thesis has been completed, the student has served as a teaching assistant, or the student has been admitted to the doctoral program, in which cases a fourth term of support may be permitted.

Inquiries

For additional information regarding teaching and research programs, contact the EECS Undergraduate Office, Room 38-476, 617-253-4654, or visit the department's website ([https://](https://www.eecs.mit.edu/academics/undergraduate-programs/meng-program)

www.eecs.mit.edu/academics/undergraduate-programs/meng-program).

Doctor of Philosophy

A candidate for the doctorate must demonstrate mastery of core content in microeconomic theory, macroeconomics, and econometrics; complete further coursework in four fields of study; and submit and defend a dissertation that represents a contribution to knowledge. The four fields are chosen from advanced economic theory, econometrics, economic development, finance, industrial organization, international economics, labor economics, monetary economics, organizational economics, political economy, and public economics. Each may be satisfied by one year of coursework, although additional coursework in a student's primary field is often recommended.

There is no required minimum number of graduate subjects in the department. Students must be in residence for a minimum of two years. However, candidates ordinarily need two full academic years of study to complete the core and field requirements, and the doctoral thesis typically requires three or four years of additional research effort.

Interdisciplinary Program

Economics and Statistics

The Interdisciplinary Doctoral Program in Statistics provides training in statistics, including classical statistics and probability as well as computation and data analysis, to students who wish to integrate these valuable skills into their primary academic program. The program is administered jointly by the departments of Aeronautics and Astronautics, Economics, Mathematics, Mechanical Engineering, Physics, and Political Science, and the Statistics and Data Science Center within the Institute for Data, Systems, and Society. It is open to current doctoral students in participating departments. For more information, including department-specific requirements, see the full program description (<http://catalog.mit.edu/interdisciplinary/graduate-programs/phd-statistics>) under Interdisciplinary Graduate Programs.

Financial Support

Many doctoral students are supported by scholarship and fellowship grants, as well as by teaching and research assistantships.

Inquiries

For more information regarding admissions or financial aid (evako@mit.edu), contact Julia Martyn-Shah, 617-253-8787. For undergraduate admissions and academic programs (gking@mit.edu), contact Gary King, 617-253-0951. For any other information (memiller@mit.edu), contact Megan Miller, 617-253-3807.

Faculty and Teaching Staff

Glenn Ellison, PhD
Gregory K. Palm (1970) Professor
Professor of Economics
Head, Department of Economics

Arnaud Costinot, PhD
Professor of Economics
Associate Head, Department of Economics

Professors

Alberto Abadie, PhD
Professor of Economics
Associate Director, Institute for Data, Systems, and Society
(On leave)

Daron Acemoglu, PhD
Institute Professor
Professor of Economics
Member, Institute for Data, Systems, and Society

Nikhil Agarwal, PhD
Professor of Economics
(On leave, fall)

George-Marios Angeletos, PhD
Professor of Economics

Joshua Angrist, PhD
Ford Professor
Professor of Economics

David Atkin, PhD
Professor of Economics

David H. Autor, PhD
Ford Professor
Professor of Economics

Abhijit Banerjee, PhD
Ford International Professor
Professor of Economics

Ricardo J. Caballero, PhD
Ford International Professor
Professor of Economics

Victor V. Chernozhukov, PhD
Ford International Professor
Professor of Economics
Member, Institute for Data, Systems, and Society
(On leave)

David J. Donaldson, PhD
Professor of Economics

Esther Duflo, PhD
Abdul Latif Jameel Professor of Poverty Alleviation and Development
Economics
Member, Institute for Data, Systems, and Society

Amy Finkelstein, PhD
John and Jennie S. MacDonald Professor
Professor of Economics

Drew Fudenberg, PhD
Paul A. Samuelson Professor
Professor of Economics

Robert S. Gibbons, PhD
Sloan Distinguished Professor of Management
Professor of Applied Economics

Jonathan Gruber, PhD
Ford Professor
Professor of Economics
(On leave, spring)

Paul L. Joskow, PhD
Elizabeth and James Killian Professor Post-Tenure
Professor Post-Tenure of Economics

Anna Mikusheva, PhD
Professor of Economics
(On leave)

Stephen Morris, PhD
Peter A. Diamond Professor
Professor of Economics

Whitney K. Newey, PhD
Ford Professor
Professor of Economics
Member, Institute for Data, Systems, and Society

Benjamin A. Olken, PhD
Jane Berkowitz Carlton and Dennis William Carlton Professor
Professor of Economics
(On leave)

Parag Pathak, PhD
Class of 1922 Professor
Professor of Economics
(On leave)

James M. Poterba, PhD
Mitsui Professor
Professor of Economics

Drazen Prelec, PhD
 Digital Equipment Corp. Leaders for Global Operations Professor of
 Management
 Professor of Management Science
 Professor of Economics
 Professor of Brain and Cognitive Sciences

Nancy L. Rose, PhD
 Charles P. Kindleberger Professor of Applied Economics
 Professor of Economics
 (On leave, fall)

Robert Townsend, PhD
 Elizabeth and James Killian (1926) Professor
 Professor of Economics

Ivan Werning, PhD
 Robert M. Solow Professor
 Professor of Economics

Michael Whinston, PhD
 Society of Sloan Fellows Professor of Management
 Professor of Economics
 Professor of Applied Economics

Alexander Greenberg Wolitzky, PhD
 Professor of Economics

Muhamet Yildiz, PhD
 Professor of Economics
 (On leave, fall)

Associate Professors

Simon Jaeger, PhD
 Silverman (1968) Family Career Development Professor
 Associate Professor of Economics
 (On leave)

Frank Schilbach, PhD
 Gary Loveman Career Development Professor
 Associate Professor of Economics

Assistant Professors

Clare Balboni, PhD
 3M Career Development Professor of Environmental Economics
 Assistant Professor of Economics
 (On leave)

Ian Ball, PhD
 Assistant Professor of Economics

Martin Beraja, PhD
 Pentti Kouri Career Development Professor
 Assistant Professor of Economics
 (On leave, fall)

Tobias Salz, PhD
 Castle Krob Career Development Professor
 Assistant Professor of Economics

Christian Wolf, PhD
 Assistant Professor of Economics

Visiting Professors

Maximilian Kasy, PhD
 Visiting Professor of Economics

Jonathan Weinstein, PhD
 Visiting Professor of Economics

Visiting Assistant Professors

Tetsuya Kaji, PhD
 Visiting Assistant Professor of Economics

Sara Lowes, PhD
 Visiting Assistant Professor of Economics

Senior Lecturers

Sara F. Ellison, PhD
 Senior Lecturer in Economics

Professors Emeriti

Olivier Jean Blanchard, PhD
 Robert M. Solow Professor Emeritus
 Professor Emeritus of Economics

Peter A. Diamond, PhD
 Institute Professor Emeritus
 Professor Emeritus of Economics

Stanley Fischer, PhD
 Professor Emeritus of Economics

Jeffrey E. Harris, MD, PhD
 Professor Emeritus of Economics

Jerry A. Hausman, PhD
 John and Jennie S. MacDonald Professor Emeritus
 Professor Emeritus of Economics

Bengt Holmström, PhD
 Paul A. Samuelson Professor Emeritus
 Professor Emeritus of Economics
 Professor Emeritus of Applied Economics

Michael J. Piore, PhD
 David W. Skinner Professor Emeritus
 Professor Emeritus of Political Economy
 Professor Emeritus of Political Science

Richard Schmalensee, PhD
Howard W. Johnson Professor Emeritus
Professor Emeritus of Management
Professor Emeritus of Economics

Robert M. Solow, PhD
Institute Professor Emeritus
Professor Emeritus of Economics

Peter Temin, PhD
Elisha Gray II Professor Emeritus
Professor Emeritus of Economics

William C. Wheaton, PhD
Professor Emeritus of Urban Studies and Planning
Professor Emeritus of Economics

General Economics and Theory

14.00 Undergraduate Internship in Economics

Prereq: Permission of instructor
U (IAP, Summer)
Units arranged [P/D/F]
Can be repeated for credit.

For Course 14 students participating in off-campus internship experiences in economics. Before registering for this subject, students must have an employment offer from a company or organization and must identify a Course 14 supervisor. Upon completion of the internship, student must submit a letter from the employer describing the work accomplished, along with a substantive final report from the student approved by the MIT supervisor. Subject to departmental approval. Consult departmental undergraduate office.
Consult D. Donaldson

14.000 Graduate Internship in Economics

Prereq: Permission of instructor
G (IAP, Summer)
Units arranged [P/D/F]
Can be repeated for credit.

For Course 14 students participating in off-campus internship experiences in economics. Before registering for this subject, students must have an employment offer from a company or organization and must identify a Course 14 supervisor. Upon completion of the internship, student must submit a letter from the employer describing the work accomplished, along with a substantive final report from the student approved by the MIT supervisor. Subject to departmental approval. Consult departmental graduate office.
Consult A. Banerjee

14.001 Data Economics and Development Policy Summer Internship

Prereq: Permission of department
G (Fall, Spring, Summer)
0-1-0 units

Provides students in the DEDP Master's program the opportunity to synthesize their coursework and professional experience in development economics and data analysis. In the context of a summer internship, students apply the knowledge gained in the program towards a project with a host organization, typically in the development sector. Students will be supported in finding a suitable opportunity or research project. All internship placements are subject to approval by the program director. Each student must write a capstone project report. Restricted to DEDP MASc students.
S. Ellison

14.003 Microeconomic Theory and Public Policy

Subject meets with 14.03
Prereq: 14.01 or permission of instructor
G (Fall, Spring)
4-0-8 units

Applies microeconomic theory to analysis of public policy. Builds from microeconomic model of consumer behavior; extends to operation of single and multiple markets and analysis of why markets sometimes fail. Empirical examples to evaluate theory, focusing on the casual effects of policy interventions on economic outcomes. Topics include minimum wages and employment, food stamps and consumer welfare, economics of risk and safety regulation, the value of education, and gains from international trade. Graduate students are expected to complete additional assignments.
Consult N. Agarwal, D. Autor, T. Salz

14.009 Economics and Society's Toughest Problems

Prereq: None

U (Fall)

1-0-2 units

Should we trade more or less with China? Why are some countries poor, and some countries rich? Why are the 1% getting richer? Should the US have a universal basic income? Why is our society becoming so polarized? What can we do to mitigate climate change? Will robots take all the jobs? Why does racism persist and how can we fight it? What will the world economy look like after the COVID-19 recession? Economics shows you how to think about some of the toughest problems facing society — and how to use data to get answers. Features lectures by MIT's economics faculty, showing how their cutting-edge research can help answer these questions. In lieu of problem sets, quizzes, or other written assignments, students produce materials of their choice (podcasts, TikToks, longer videos) with the view to make a potential audience excited about economics. Subject can count toward the 6-unit discovery-focused credit limit for first-year students.

*E. Duflo***14.01 Principles of Microeconomics**

Prereq: None

U (Fall, Spring)

3-0-9 units. HASS-S

Introduces microeconomic concepts and analysis, supply and demand analysis, theories of the firm and individual behavior, competition and monopoly, and welfare economics. Applications to problems of current economic policy.

*J. Gruber, S. Ellison***14.02 Principles of Macroeconomics**

Prereq: None

U (Fall, Spring)

3-0-9 units. HASS-S

Provides an overview of macroeconomic issues including the determination of national income, economic growth, unemployment, inflation, interest rates, and exchange rates. Introduces basic macroeconomic models and illustrates key principles through applications to the experience of the US and other economies. Explores a range of current policy debates, such as the economic effects of monetary and fiscal policy, the causes and consequences of the 2008 global financial crisis, and the factors that influence long-term growth in living standards. Lectures are recorded and available for students with scheduling conflicts.

*M. Beraja, R. Caballero, J. Poterba***14.03 Microeconomic Theory and Public Policy**

Subject meets with 14.003

Prereq: 14.01 or permission of instructor

U (Fall, Spring)

4-0-8 units. HASS-S

Applies microeconomic theory to analysis of public policy. Builds from microeconomic model of consumer behavior; extends to operation of single and multiple markets and analysis of why markets sometimes fail. Empirical examples to evaluate theory, focusing on the casual effects of policy interventions on economic outcomes. Topics include minimum wages and employment, food stamps and consumer welfare, economics of risk and safety regulation, the value of education, and gains from international trade.

*Consult N. Agarwal, D. Autor, T. Salz***14.04 Intermediate Microeconomic Theory**

Prereq: Calculus II (GIR) and 14.01

U (Fall)

4-0-8 units. HASS-S

Introduction to theory and data for students interested in economic science. Introduction to consumer choice, the theory of the firm and general equilibrium models, with an overview of the main results and tools used in these subjects, both directly and indirectly as used in a variety of fields. Includes analysis of consumer and producer decisions, partial and general equilibrium analysis, insurance, the welfare theorems and failures of these theorems as with externalities but with resolutions, contract theory and mechanism design, policy analysis, the content of theory for data, and the design of media of exchange as with Bitcoin and markets made possible by distributed ledgers.

*R. Townsend***14.05 Intermediate Macroeconomics**

Prereq: 14.01 and (14.02 or permission of instructor)

U (Fall)

4-0-8 units. HASS-S

Uses the tools of macroeconomics to investigate various macroeconomic issues in depth. Topics range from economic growth and inequality in the long run to economic stability and financial crises in the short run. Surveys many economic models used today. Requires a substantial research paper on the economics of long-run economic growth.

Consult Department Headquarters

14.06 Advanced Macroeconomics

Prereq: 14.01 and 14.02

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: U (Fall)

4-0-8 units. HASS-S

Blends a thorough study of the theoretical foundations of modern macroeconomics with a review of useful mathematical tools, such as dynamic programming, optimal control, and dynamic systems. Develops comfort with formal macroeconomic reasoning and deepens understanding of key macroeconomic phenomena, such as business cycles. Goes on to study more specific topics, such as unemployment, financial crises, and the role of fiscal and monetary policy. Special attention to reviewing relevant facts and disentangling them from their popular interpretations. Uses insights and tools from game theory. Includes applications to recent and historical events.

G. M. Angeletos

14.08 Technical Topics in Economics

Prereq: 14.01

U (Fall, Spring)

4-0-8 units

Can be repeated for credit.

Considers technical issues of current research interest in economics.
Consult Department Headquarters

14.09 Reading Seminar in Economics

Prereq: 14.04 and 14.06

U (Fall, IAP, Spring, Summer)

Units arranged [P/D/F]

Can be repeated for credit.

Reading and discussion of particular topics in economics. Open to undergraduate students by arrangement with individual faculty members. Consult Department Headquarters.

D. Donaldson

14.10 Reading Seminar in Economics

Prereq: 14.04 and 14.06

U (Fall, IAP, Spring, Summer)

Units arranged

Can be repeated for credit.

Reading and discussion of particular topics in economics. Open to undergraduate students by arrangement with individual faculty members. Consult Department Headquarters.

D. Donaldson

14.11 Topics in Economics

Prereq: 14.01

U (Fall)

Not offered regularly; consult department

4-0-8 units. HASS-S

Can be repeated for credit.

Considers issues of current research interest in economics.
Consult Department Headquarters

14.12 Economic Applications of Game Theory

Prereq: 14.01 and (6.041B, 14.04, 14.30, 18.05, or permission of instructor)

U (Fall)

4-0-8 units. HASS-S

Analysis of strategic behavior in multi-person economic settings. Introduction to solution concepts, such as rationalizability, backwards induction, Nash equilibrium, subgame-perfect equilibrium, and sequential equilibrium. Strong emphasis on dynamic games, such as repeated games. Introduction to Bayesian games, focusing on Bayesian Nash Equilibrium, Perfect Bayesian Equilibrium, and signaling games. Applications drawn from microeconomics: imperfect competition, implicit cartels, bargaining, and auctions.

I. Ball

14.121 Microeconomic Theory I

Prereq: 14.04 and permission of instructor

G (Fall; first half of term)

3-0-3 units

Covers consumer and producer theory, markets and competition, general equilibrium and the welfare theorems; featuring applications, uncertainty, identification and restrictions models place on data. Enrollment limited; preference to PhD students.

P. Pathak

14.122 Microeconomic Theory II

Prereq: 14.121 and permission of instructor

G (Fall; second half of term)

3-0-3 units

Introduction to game theory. Topics include normal form and extensive form games, and games with incomplete information. Enrollment limited.

G. Ellison

14.123 Microeconomic Theory III

Prereq: 14.121, 14.122, and permission of instructor

G (Spring; first half of term)

3-0-3 units

Models of individual decision-making under certainty and uncertainty. Additional topics in game theory. Enrollment limited.

*D. Fudenberg***14.124 Microeconomic Theory IV**

Prereq: 14.123 or permission of instructor

G (Spring; second half of term)

3-0-3 units

Introduction to statistical decision theory, incentive contracting (moral hazard and adverse selection), mechanism design and incomplete contracting. Enrollment limited.

*A. Wolitzky***14.125 Market Design**

Prereq: 14.124

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: G (Spring)

4-0-8 units

Theory and practice of market design, building on ideas from microeconomics, game theory and mechanism design. Prominent case studies include auctions, labor markets, school choice, prediction markets, financial markets, and organ exchange clearinghouses.

*P. Pathak***14.126 Game Theory**

Prereq: 14.122

G (Spring)

3-0-9 units

Investigates equilibrium and non-equilibrium solution concepts and their foundations as the result of learning or evolution. Studies the equilibria of supermodular games, global games, repeated games, signaling games, and models of bargaining, cheap talk, and reputation.

*D. Fudenberg, A. Wolitzky, M. Yildiz***14.127 Advanced Game Theory**

Prereq: None

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: G (Fall)

4-0-8 units

For students who plan to do game theory research. Covers the following topics: epistemic foundations of game theory, higher order beliefs, the role and status of common prior assumptions, social networks and social learning, repeated and stochastic games, non-equilibrium learning, stochastic stability and evolutionary dynamics, game theory experiments, and behavioral game theory.

*D. Fudenberg, M. Yildiz***14.13 Psychology and Economics**

Subject meets with 14.131

Prereq: 14.01

U (Spring)

4-0-8 units. HASS-S

Introduces the theoretical and empirical literature of behavioral economics. Examines important and systematic departures from the standard models in economics by incorporating insights from psychology and other social sciences. Covers theory and evidence on time, risk, and social preferences; beliefs and learning; emotions; limited attention; and frames, defaults, and nudges. Studies applications to many different areas, such as credit card debt, procrastination, retirement savings, addiction, portfolio choice, poverty, labor supply, happiness, and government policy. Students participate in surveys and experiments in class, review evidence from lab experiments, examine how the results can be integrated into models, and test models using field and lab data. Students taking graduate version complete additional assignments.

*F. Schilbach***14.130 Reading Economic Theory**

Prereq: 14.121 and 14.451

G (Fall)

2-0-10 units

Can be repeated for credit.

Class will read and discuss current research in economic theory with a focus on game theory, decision theory, and behavioral economics. Students will be expected to make one presentation and to read and post comments on every paper by the day before the paper is presented. Permission of the instructor required, and auditors are not allowed.

D. Fudenberg

14.131 Psychology and Economics

Subject meets with 14.13

Prereq: 14.01

G (Spring)

4-0-8 units

Introduces the theoretical and empirical literature of behavioral economics. Examines important and systematic departures from the standard models in economics by incorporating insights from psychology and other social sciences. Covers theory and evidence on time, risk, and social preferences; beliefs and learning; emotions; limited attention; and frames, defaults, and nudges. Studies applications to many different areas, such as credit card debt, procrastination, retirement savings, addiction, portfolio choice, poverty, labor supply, happiness, and government policy. Students participate in surveys and experiments in class, review evidence from lab experiments, examine how the results can be integrated into models, and test models using field and lab data. Students taking graduate version complete additional assignments.

*F. Schilbach***14.137[J] Psychology and Economics**

Same subject as 9.822[J]

Prereq: None

G (Spring)

4-0-8 units

Examines "psychology appreciation" for economics students. Aims to enhance knowledge and intuition about psychological processes in areas relevant to economics. Increases understanding of psychology as an experimental discipline, with its own distinct rules and style of argument. Topics include self-knowledge, cognitive dissonance, self-deception, emotions, social norms, self-control, learning, mental accounting, memory, individual and group behavior, and some personality and psycho-analytic models. Within each of these topics, we showcase effective and central experiments and discuss their role in the development of psychological theory. Term paper required.

*D. Prelec***14.147 Topics in Game Theory**

Prereq: 14.126

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: G (Spring)

4-0-8 units

Advanced subject on topics of current research interest.

*D. Fudenberg***14.15[J] Networks**

Same subject as 6.3260[J]

Subject meets with 14.150

Prereq: 6.3700 or 14.30

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: U (Spring)

4-0-8 units. HASS-S

Highlights common principles that permeate the functioning of diverse technological, economic and social networks. Utilizes three sets of tools for analyzing networks -- random graph models, optimization, and game theory -- to study informational and learning cascades; economic and financial networks; social influence networks; formation of social groups; communication networks and the Internet; consensus and gossiping; spread and control of epidemics; control and use of energy networks; and biological networks. Students taking graduate version complete additional assignments.

*A. Wolitzky***14.150 Networks**

Subject meets with 6.3260[J], 14.15[J]

Prereq: 6.3700 or 14.300

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: G (Spring)

4-0-8 units

Highlights common principles that permeate the functioning of diverse technological, economic and social networks. Utilizes three sets of tools for analyzing networks -- random graph models, optimization, and game theory -- to study informational and learning cascades; economic and financial networks; social influence networks; formation of social groups; communication networks and the Internet; consensus and gossiping; spread and control of epidemics; control and use of energy networks; and biological networks. Students taking graduate version complete additional assignments.

*A. Wolitzky***14.16 Strategy and Information**

Subject meets with 14.161

Prereq: 14.01 or permission of instructor

U (Spring)

4-0-8 units. HASS-S

Covers modern applications of game theory where incomplete information plays an important role. Applications include bargaining, auctions, global games, market design, information design, and network economics. Students taking graduate version complete additional assignments.

M. Yildiz

14.160 Behavioral Economics

Prereq: 14.122

G (Spring)

4-0-8 units

Covers recent theory and empirical evidence in behavioral economics. Topics include deviations from the neoclassical model in terms of (i) preferences (present bias, reference dependence, social preferences), (ii) beliefs (overconfidence, projection bias), and (iii) decision-making (cognition, attention, framing, persuasion), as well as (iv) market reactions to such deviations. Applications will cover a large range of fields, including labor and public economics, industrial organization, health economics, finance, and development economics.

*A. Banerjee, F. Schilbach***14.161 Strategy and Information (New)**

Subject meets with 14.16

Prereq: 14.01 or permission of instructor

G (Spring)

4-0-8 units

Covers modern applications of game theory where incomplete information plays an important role. Applications include bargaining, auctions, global games, market design, information design, and network economics. Students taking graduate version complete additional assignments.

*M. Yildiz***14.18 Mathematical Economic Modeling**

Prereq: 14.04, 14.12, 14.15[II], or 14.19

U (Spring)

4-0-8 units. HASS-S

Guides students through the process of developing and analyzing formal economic models and effectively communicating their results. Topics include decision theory, game theory, voting, and matching. Instruction and practice in oral and written communication provided. Prior coursework in microeconomic theory and/or proof-based mathematics required.

*Consult Department Headquarters***14.19 Market Design**

Prereq: 14.01

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: U (Spring)

4-0-8 units. HASS-S

Covers the design and operation of organized markets, building on ideas from microeconomic and game theory. Topics may include mechanism design, auctions, matching markets, and other resource allocation problems.

*P. Pathak***14.191 Independent Research Paper**

Prereq: Permission of instructor

G (Fall, IAP, Spring, Summer)

0-12-0 units

Can be repeated for credit.

Under supervision of a faculty member approved by Graduate Registration Officer, student writes a substantial, probably publishable research paper. Must be completed by the end of a student's second year to satisfy the departmental minor requirement.

*Staff***14.192 Advanced Research and Communication**

Prereq: 14.124, 14.382, and 14.454

G (Fall, IAP, Spring)

2-4-6 units

Can be repeated for credit.

Guides second-year Economics PhD students through the process of conducting and communicating economic research. Students choose topics for research projects, develop research strategies, carry out analyses, and write and present research papers. Limited to second year Economics PhD students.

*Consult Department Headquarters***14.193 Advanced Seminar in Economics**

Prereq: 14.121 and 14.451

G (Fall, Spring, Summer)

Units arranged

Can be repeated for credit.

Reading and discussion of current topics in economics. Open to advanced graduate students by arrangement with individual members of the staff.

*Consult Department headquarters***14.195 Reading Seminar in Economics**

Prereq: 14.121

G (Fall, Spring, Summer)

Units arranged [P/D/F]

Can be repeated for credit.

Reading and discussion of current topics in economics. Open to advanced graduate students by arrangement with individual members of the staff.

Staff

14.197 Independent Research

Prereq: None

G (Fall, IAP, Spring, Summer)

Units arranged [P/D/F]

Can be repeated for credit.

Under supervision of a faculty member approved by Graduate Registration Officer, student conducts independent research.
Staff

14.198, 14.199 Teaching Introductory Economics

Prereq: None

G (Fall, Spring)

2-0-2 units

Can be repeated for credit.

Required of teaching assistants in introductory economics (14.01 and 14.02), under supervision of the faculty member in charge of the subject.

14.198: J. Gruber, S. Ellison. 14.199: M. Beraja, R. Caballero

14.281 Contract Economics

Prereq: 14.124

G (Fall)

4-0-8 units

Covers theoretical research on contracts in static as well as dynamic settings. Emphasis is on canonical models in contracting (agency theory, mechanism design, incomplete contracting) illustrated by major areas of application (e.g. compensation, labor and capital markets, property rights, organizational design, corporate finance).

J. Ball, S. Morris

Industrial Organization

14.20 Industrial Organization: Competitive Strategy and Public Policy

Subject meets with 14.200

Prereq: 14.01

U (Spring)

4-0-8 units. HASS-S

Analyzes the current debate over the rise of monopolies, the strategic behavior and performance of firms in imperfectly competitive markets, and the role of competition policy. Topics include monopoly power; pricing, product choice, and innovation decisions by firms in oligopoly markets; static and dynamic measurement of market performance; and incentives in organizations. Requires regular participation in class discussion and teamwork in a competitive strategy game. Students taking graduate version complete additional assignments.

N. Rose

14.200 Industrial Organization: Competitive Strategy and Public Policy

Subject meets with 14.20

Prereq: 14.01

G (Spring)

4-0-8 units

Analyzes the current debate over the rise of monopolies, the strategic behavior and performance of firms in imperfectly competitive markets, and the role of competition policy. Topics include monopoly power; pricing, product choice, and innovation decisions by firms in oligopoly markets; static and dynamic measurement of market performance; and incentives in organizations. Requires regular participation in class discussion and teamwork in a competitive strategy game. Students taking graduate version complete additional assignments.

N. Rose

14.27 Economics and E-Commerce

Subject meets with 14.270

Prereq: 14.01 and (6.3700 or 14.30)

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: U (Spring)

4-0-8 units. HASS-S

Uses theoretical economic models and empirical evidence to help understand the growth and future of e-commerce. Economic models help frame class discussions of, among other topics, content provision, privacy, piracy, sales taxation, group purchasing, price search, and advertising on the internet. Empirical project and paper required. Students taking graduate version complete additional assignments.

S. Ellison

14.270 Economics and E-Commerce

Subject meets with 14.27

Prereq: 14.01 and (6.3700 or 14.30)

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: G (Spring)

4-0-8 units

Uses theoretical economic models and empirical evidence to help understand the growth and future of e-commerce. Economic models help frame class discussions of, among other topics, content provision, privacy, piracy, sales taxation, group purchasing, price search, and advertising on the internet. Empirical project and paper required. Students taking graduate version complete additional assignments.

S. Ellison

14.271 Industrial Organization I

Prereq: None. Coreq: 14.122 and 14.381

G (Fall)

5-0-7 units

Covers theoretical and empirical work dealing with the structure, behavior, and performance of firms and markets and core issues in antitrust. Topics include: the organization of the firm, monopoly, price discrimination, oligopoly, and auctions. Theoretical and empirical work are integrated in each area.

*G. Ellison***14.272 Industrial Organization II**

Prereq: 14.271

G (Spring)

5-0-7 units

Continuation of 14.271. Focuses on government interventions in monopoly and oligopoly markets, and addresses both competition and regulatory policy. Topics include horizontal merger policy and demand estimation, vertical integration and vertical restraints, and the theory and practice of economic regulation. Applications include the political economy of regulation; the performance of economic regulation; deregulation in sectors including electric power, transportation, and financial services; and pharmaceutical and environmental regulation in imperfectly competitive product markets.

*N. Rose, M. Whinston***14.273 Advanced Topics in Industrial Organization**

Prereq: 14.271

G (Spring)

5-0-7 units

Empirical analysis of theoretically derived models of market behavior. Varied topics include demand estimation, differentiated products, production functions, analysis of market power, entry and exit, vertical relationships, auctions, matching markets, network externalities, dynamic oligopoly, moral hazard and adverse selection. Discussion will focus on methodological issues, including identification, estimation, counter-factual analysis and simulation techniques.

*N. Agarwal, T. Salz***Organizational Economics****14.26[J] Organizational Economics**

Same subject as 15.039[J]

Subject meets with 14.260

Prereq: 14.01

U (Spring)

4-0-8 units. HASS-S

Provides a rigorous, but not overly technical introduction to the economic theory of organization together with a varying set of applications. Addresses incentives, control, relationships, decision processes, and organizational culture and performance. Introduces selected fundamentals of game theory. Students taking graduate version complete additional assignments. Limited to 60.

*C. Angelucci***14.260 Organizational Economics**

Subject meets with 14.26[J], 15.039[J]

Prereq: None

G (Spring)

4-0-8 units

Provides a rigorous, but not overly technical introduction to the economic theory of organization together with a varying set of applications. Addresses incentives, control, relationships, decision processes, and organizational culture and performance. Introduces selected fundamentals of game theory. Students taking graduate version complete additional assignments. Limited to 60.

*C. Angelucci***14.282 Introduction to Organizational Economics**

Prereq: 14.124

G (Fall)

5-0-7 units

Begins with survey of contract theory for organizational economists, then introduces the main areas of the field, including the boundary of the firm; decision-making, employment, structures and processes in organizations; and organizations other than firms.

*C. Angelucci, R. Gibbons***14.283 Advanced Topics in Organizational Economics I**

Prereq: 14.282

G (Spring; first half of term)

2-0-4 units

Builds on the work done in 14.282 to develop more in-depth analysis of topics in the field.

R. Gibbons

14.284 Advanced Topics in Organizational Economics II

Prereq: 14.282

G (Spring; second half of term)

2-0-4 units

Builds on the work done in 14.282 to develop more in-depth analysis of topics in the field.

C. Angelucci

Statistics and Econometrics

14.30 Introduction to Statistical Methods in Economics

Subject meets with 14.300

Prereq: Calculus II (GIR)

U (Fall)

4-0-8 units. REST

Self-contained introduction to probability and statistics with applications in economics and the social sciences. Covers elements of probability theory, statistical estimation and inference, regression analysis, causal inference, and program evaluation. Couples methods with applications and with assignments involving data analysis. Uses basic calculus and matrix algebra. Students taking graduate version complete additional assignments. May not count toward HASS requirement.

A. Abadie

14.300 Introduction to Statistical Methods in Economics

Subject meets with 14.30

Prereq: Calculus II (GIR)

G (Fall)

4-0-8 units

Self-contained introduction to probability and statistics with applications in economics and the social sciences. Covers elements of probability theory, statistical estimation and inference, regression analysis, causal inference, and program evaluation. Couples methods with applications and with assignments involving data analysis. Uses basic calculus and matrix algebra. Students taking graduate version complete additional assignments.

A. Abadie

14.310 Data Analysis for Social Scientists

Prereq: None

G (Spring)

Not offered regularly; consult department

4-0-8 units

Introduces methods for harnessing data to answer questions of cultural, social, economic, and policy interest. Presents essential notions of probability and statistics. Covers techniques in modern data analysis: regression and econometrics, prediction, design of experiment, randomized control trials (and A/B testing), machine learning, data visualization, analysis of network data, and geographic information systems. Projects include analysis of data with a written description and interpretation of results; may involve gathering of original data or use of existing data sets. Applications drawn from real world examples and frontier research. Instruction in use of the statistical package R. Students taking graduate version complete additional assignments.

Consult E. Duflo

14.32 Econometric Data Science

Subject meets with 14.320

Prereq: 14.30

U (Fall, Spring)

4-4-4 units. Institute LAB

Introduces regression and other tools for causal inference and descriptive analysis in empirical economics. Topics include analysis of randomized experiments, instrumental variables methods and regression discontinuity designs, differences-in-differences estimation, and regression with time series data. Develops the skills needed to conduct — and critique — empirical studies in economics and related fields. Empirical applications are drawn from published examples and frontier research. Familiarity with statistical programming languages is helpful. Students taking graduate version complete an empirical project leading to a short paper. Limited to 70 total for versions meeting together.

A. Mikusheva, J. Angrist

14.320 Econometric Data Science

Subject meets with 14.32

Prereq: 14.300

G (Fall, Spring)

4-4-4 units

Introduces regression and other tools for causal inference and descriptive analysis in empirical economics. Topics include analysis of randomized experiments, instrumental variables methods and regression discontinuity designs, differences-in-differences estimation, and regress with time series data. Develops the skills needed to conduct — and critique — empirical studies in economics and related fields. Empirical applications are drawn from published examples and frontier research. Familiarity with statistical programming languages is helpful. Students taking graduate version complete an empirical project leading to a short paper. Limited to 70 total for versions meeting together.

A. Mikusheva, J. Angrist

14.33 Research and Communication in Economics: Topics, Methods, and Implementation

Prereq: 14.32 and (14.01 or 14.02)

U (Fall, Spring)

3-4-5 units. HASS-S

Exposes students to the process of conducting independent research in empirical economics and effectively communicating the results of the research. Emphasizes econometric analysis of an assigned economic question and culminates in each student choosing an original topic, performing appropriate analysis, and delivering oral and written project reports. Limited to 20 per section.

Staff

14.36 Advanced Econometrics

Subject meets with 14.387

Prereq: 14.32

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: U (Spring; first half of term)

2-0-4 units

Emphasizes econometric theory, methods, and applications using regression, instrumental variables, differences-in-differences, regression discontinuity designs, machine learning and big data sets, and problems related to standard errors and statistical inference. Includes a project with a theoretical, written and data-analytic component. Familiarity with Stata or a similar statistical programming language recommended. Students taking graduate version complete additional assignments.

J. Angrist

14.38 Inference on Causal and Structural Parameters Using ML and AI

Subject meets with 14.388

Prereq: 14.32

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: U (Spring)

4-0-8 units

Provides an applied treatment of modern causal inference with high-dimensional data, focusing on empirical economic problems encountered in academic research and the tech industry. Formulates problems in the languages of structural equation modeling and potential outcomes. Presents state-of-the-art approaches for inference on causal and structural parameters, including de-biased machine learning, synthetic control methods, and reinforcement learning. Introduces tools from machine learning and deep learning developed for prediction purposes, and discusses how to adapt them to learn causal parameters. Emphasizes the applied and practical perspectives. Requires knowledge of mathematical statistics and regression analysis and programming experience in R or Python.

V. Chernozhukov

14.380 Statistical Method in Economics

Prereq: 14.32 or permission of instructor

G (Fall; first half of term)

3-0-3 units

Introduction to probability and statistics as background for advanced econometrics. Covers elements of probability theory, sampling theory, asymptotic approximations, hypothesis testing, and maximum-likelihood methods. Illustrations from economics and application of these concepts to economic problems. Limited to 40 PhD students.

A. Mikusheva

14.381 Estimation and Inference for Linear Causal and Structural Models

Prereq: 14.380

G (Fall; second half of term)

3-0-3 units

Explains basic econometric ideas and methods, illustrating with empirical applications. Causal inference is emphasized and examples of economic structural models are given. Topics include randomized trials, regression, including discontinuity designs and diff-in-diffs, and instrumental variables, including local average treatment effects. Basic asymptotic theory for regression is covered and robust standard errors and statistical inference methods are given. Restricted to PhD students from Courses 14 and 15. Instructor approval required for all others.

W. Newey

14.382 Econometrics

Prereq: 14.381 or permission of instructor

G (Spring)

5-0-7 units

Covers key models as well as identification and estimation methods used in modern econometrics. Presents modern ways to set up problems and do better estimation and inference than the current empirical practice. Introduces generalized method of moments and the method of M-estimators in addition to more modern versions of these methods dealing with important issues, such as weak identification or biases arising in high dimensions. Also discusses the bootstrap and explores very high dimensional formulations, or "big data." Students gain practical experience by applying the methods to real data sets. Enrollment limited.

*V. Chernozhukov***14.384 Time Series Analysis**

Prereq: 14.382 or permission of instructor

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: G (Fall)

5-0-7 units

Studies theory and application of time series methods in econometrics, including spectral analysis, estimation with stationary and non-stationary processes, VARs, factor models, unit roots, cointegration, estimation of DSGE models, and Bayesian methods. Enrollment limited.

*A. Mikusheva***14.385 Nonlinear Econometric Analysis**

Prereq: 14.382 or permission of instructor

G (Fall)

5-0-7 units

Develops a full understanding of and ability to apply micro-econometric models and methods. Topics include extremum estimators, including minimum distance and simulated moments, identification, partial identification, sensitivity analysis, many weak instruments, nonlinear panel data, de-biased machine learning, discrete choice models, nonparametric estimation, quantile regression, and treatment effects. Methods are illustrated with economic applications. Enrollment limited.

*A. Abadie, W. Newey***14.386 New Econometric Methods**

Prereq: 14.382

G (Spring)

4-0-8 units

Exposes students to the frontier of econometric research. Includes fundamental topics such as empirical processes, semiparametric estimation, nonparametric instrumental variables, inference under partial identification, large-scale inference, empirical Bayes, and machine learning methods. Other topics vary from year to year, but can include empirical likelihood, weak identification, and networks.

*A. Abadie, W. Newey***14.387 Applied Econometrics**

Subject meets with 14.36

Prereq: 14.382

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: G (Spring; first half of term)

2-0-4 units

Emphasizes econometric theory, methods, and applications using regression, instrumental variables, differences-in-differences, regression discontinuity designs, machine learning and big data sets, and problems related to standard errors and statistical inference. Includes a project with a theoretical, written and data-analytic component. Students taking graduate version complete additional assignments.

*J. Angrist***14.388 Inference on Causal and Structural Parameters Using ML and AI**

Subject meets with 14.38

Prereq: 14.381

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: G (Spring)

4-0-8 units

Provides an applied treatment of modern causal inference with high-dimensional data, focusing on empirical economic problems encountered in academic research and the tech industry. Formulates problems in the languages of structural equation modeling and potential outcomes. Presents state-of-the-art approaches for inference on causal and structural parameters, including de-biased machine learning, synthetic control methods, and reinforcement learning. Introduces tools from machine learning and deep learning developed for prediction purposes, and discusses how to adapt them to learn causal parameters. Emphasizes the applied and practical perspectives. Requires knowledge of mathematical statistics and regression analysis and programming experience in R or Python.

V. Chernozhukov

14.391 Workshop in Economic Research

Prereq: 14.124 and 14.454

G (Fall)

2-0-10 units

Can be repeated for credit.

Develops research ability of students through intensive discussion of dissertation research as it proceeds, individual or group research projects, and critical appraisal of current reported research.

Workshops divided into various fields, depending on interest and size.

*Staff***14.392 Workshop in Economic Research**

Prereq: 14.124 and 14.454

G (Spring)

2-0-10 units

Can be repeated for credit.

Develops research ability of students through intensive discussion of dissertation research as it proceeds, individual or group research projects, and critical appraisal of current reported research.

Workshops divided into various fields, depending on interest and size.

*Staff***14.399 Seminar in Data Economics and Development Policy**

Prereq: Permission of instructor

G (Spring)

2-0-10 units

Group study of current topics in development policy and research. Includes student presentations and invited speakers. Restricted to DEDP MASc students.

*S. Ellison***National Income and Finance****14.41 Public Finance and Public Policy**

Prereq: 14.01

U (Fall)

4-0-8 units. HASS-S

Explores the role of government in the economy, applying tools of basic microeconomics to answer important policy questions such as government response to global warming, school choice by K-12 students, Social Security versus private retirement savings accounts, government versus private health insurance, setting income tax rates for individuals and corporations.

*J. Gruber***14.416[.] Asset Pricing**

Same subject as 15.470[.]

Prereq: None

G (Fall)

4-0-8 units

See description under subject 15.470[.]

*L. Kogan, L. Schmidt***14.42 Environmental Policy and Economics**

Subject meets with 14.420

Prereq: 14.01

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: U (Spring)

4-0-8 units. HASS-S

Introduces key concepts and recent advances in environmental economics, and explores their application to environmental policy questions. Topics include market efficiency and market failure, methods for valuing the benefits of environmental quality, the proper role of government in the regulation of the environment, environmental policy design, and implementation challenges. Considers international aspects of environmental policy as well, including the economics of climate change, trade and the environment, and environmental challenges in developing countries. Students taking graduate version complete additional assignments.

*C. Balboni***14.420 Environmental Policy and Economics**

Subject meets with 14.42

Prereq: 14.01

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: G (Spring)

4-0-8 units

Introduces students to key concepts and recent advances in environmental economics, and explores their application to environmental policy questions. Topics include market efficiency and market failure, methods for valuing the benefits of environmental quality, the proper role of government in the regulation of the environment, environmental policy design and implementation challenges. Also considers international aspects of environmental policy including the economics of climate change, trade and the environment and environmental challenges in developing countries. Students taking graduate version complete additional assignments.

C. Balboni

14.43[J] Economics of Energy, Innovation, and Sustainability

Same subject as 15.0201[J]

Prereq: 14.01 or 15.0111

U (Fall)

3-0-9 units. HASS-S

Credit cannot also be received for 15.020

See description under subject 15.0201[J].

J. Li

14.44[J] Energy Economics and Policy

Same subject as 15.037[J]

Prereq: 14.01 or 15.0111

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: U (Spring)

4-0-8 units. HASS-S

Credit cannot also be received for 14.444[J], 15.038[J]

Analyzes business and public policy issues in energy markets and in the environmental markets to which they are closely tied. Examines the economic determinants of industry structure and evolution of competition among firms in these industries. Investigates successful and unsuccessful strategies for entering new markets and competing in existing markets. Industries studied include oil, natural gas, coal, electricity, and transportation. Topics include climate change and environmental policy, the role of speculation in energy markets, the political economy of energy policies, and market power and antitrust. Two team-based simulation games, representing the world oil market and a deregulated electricity market, act to cement the concepts covered in lecture. Students taking graduate version complete additional assignments. Limited to 60.

C. Knittel

14.440[J] Advanced Corporate Finance

Same subject as 15.473[J]

Prereq: None

G (Spring)

3-0-9 units

See description under subject 15.473[J]. Primarily for doctoral students in finance, economics, and accounting.

D. Thesmar, A. Schoar

14.441[J] Corporate Finance

Same subject as 15.471[J]

Prereq: None

G (Spring)

3-0-9 units

See description under subject 15.471[J].

A. Schoar, D. Thesmar

14.442[J] Advanced Asset Pricing

Same subject as 15.472[J]

Prereq: None

G (Fall)

3-0-9 units

See description under subject 15.472[J]. Primarily for doctoral students in finance, economics, and accounting.

J. Parker

14.444[J] Energy Economics and Policy

Same subject as 15.038[J]

Prereq: 14.01 or 15.0111

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: G (Spring)

4-0-8 units

Credit cannot also be received for 14.44[J], 15.037[J]

Theoretical and empirical perspectives on individual and industrial demand for energy, energy supply, energy markets, and public policies affecting energy markets. Discusses aspects of the oil, natural gas, electricity, and nuclear power sectors. Examines energy tax, price regulation, deregulation, energy efficiency and policies for controlling pollution and CO₂ emissions. Students taking the graduate version complete additional assignments. Limited to 60.

C. Knittel

14.448[J] Current Topics in Finance

Same subject as 15.474[J]

Prereq: None

G (Spring)

3-0-9 units

Can be repeated for credit.

See description under subject 15.474[J]. Primarily for doctoral students in accounting, economics, and finance.

Consult K. Nixon

14.449[J] Current Research in Financial Economics

Same subject as 15.475[J]

Prereq: Permission of instructor

G (Fall, IAP, Spring, Summer)

3-0-3 units

Can be repeated for credit.

See description under subject 15.475[J]. Restricted to doctoral students.

A. Verdelhan

14.451 Dynamic Optimization Methods with Applications

Prereq: 14.06 and permission of instructor

G (Fall; first half of term)

3-0-3 units

Provides an introduction to dynamic optimization methods, including discrete-time dynamic programming in non-stochastic and stochastic environments, and continuous time methods including the Pontryagin maximum principle. Applications may include the Ramsey model, irreversible investment models, and consumption choices under uncertainty. Enrollment limited.

*C. Wolf***14.452 Economic Growth**

Prereq: 14.451 and permission of instructor

G (Fall; second half of term)

3-0-3 units

Introduces the sources and modeling of economic growth and income differences across nations. Topics include an introduction to dynamic general equilibrium theory, the neoclassical growth model, overlapping generations, determinants of technological progress, endogenous growth models, measurement of technological progress, the role of human capital in economic growth, and growth in a global economy. Enrollment limited.

*D. Acemoglu***14.453 Economic Fluctuations**

Prereq: 14.452 and permission of instructor

G (Spring; first half of term)

3-0-3 units

Investigation of why aggregate economic activity fluctuates, and the role of policy in affecting fluctuations. Topics include the link between monetary policy and output, the economic cost of aggregate fluctuations, the costs and benefits of price stability, and the role of central banks. Introduction to real business cycle and new Keynesian models. Enrollment limited.

*I. Werning***14.454 Economic Crises**

Prereq: 14.453 and permission of instructor

G (Spring; second half of term)

3-0-3 units

Provides an overview of models of the business cycle caused by financial markets' frictions and shocks. Topics include credit crunch, collateral shocks, bank runs, contagion, speculative bubbles, credit booms, leverage, safe asset shortages, capital flows and sudden stops. Enrollment limited.

*R. Caballero***14.461 Advanced Macroeconomics I**

Prereq: 14.122 and 14.452

G (Fall)

5-0-7 units

Advanced subject in macroeconomics that seeks to bring students to the research frontier. Topics vary from year to year, covering a wide spectrum of classical and recent research. Topics may include business cycles, optimal monetary and tax policy, monetary economics, banking, and financial constraints on investment and incomplete markets.

*M. Beraja, I. Werning***14.462 Advanced Macroeconomics II**

Prereq: 14.461

G (Spring)

5-0-7 units

Topics vary from year to year. Often includes coordination failures; frictions in beliefs, such as rational inattention, higher-order uncertainty, certain forms of bounded rationality, heterogeneous beliefs, and ambiguity; implications for business cycles, asset markets, and policy; financial frictions and obstacles to trade; intermediation; liquidity; safe assets; global imbalances; financial crises; and speculation.

*Consult Department Headquarters***14.47[J] Global Energy: Politics, Markets, and Policy**

Same subject as 11.167[J], 15.2191[J], 17.399[J]

Prereq: None

U (Spring)

Not offered regularly; consult department

3-0-9 units. HASS-S

Credit cannot also be received for 11.267[J], 15.219[J]

See description under subject 15.2191[J]. Preference to juniors, seniors, and Energy Minors.

*V. Karplus***14.471 Public Economics I**

Prereq: 14.04

G (Spring)

4-0-8 units

Theory and evidence on government taxation policy. Topics include tax incidence; optimal tax theory; the effect of taxation on labor supply and savings; taxation and corporate behavior; and tax expenditure policy.

J. Poterba, I. Werning

14.472 Public Economics II

Prereq: 14.471

G (Fall)

3-0-9 units

Focuses on government expenditures and policies designed to correct market failures and/or redistribute resources. Key topics include theoretical and empirical analysis of insurance market failures, the optimal design of social insurance programs, and the design of redistributive programs.

*A. Finkelstein***14.475 Environmental Economics**

Prereq: None

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: G (Spring)

4-0-8 units

Theory and evidence on environmental externalities and regulatory, tax and other government responses to problems of market failure. Topics include cost-benefit analysis; measurement of the benefits of non-market goods; evaluation of the impacts of regulation; and international environmental issues including the economics of climate change and trade and the environment.

*C. Balboni***International, Interregional, and Urban Economics****14.54 International Trade**

Subject meets with 14.540

Prereq: 14.01

U (Fall)

4-0-8 units. HASS-S

Provides an introduction to theoretical and empirical topics in international trade. Offers a brief history of globalization. Introduces the theory of comparative advantage and discusses its implications for international specialization and wage inequality. Studies the determinants and consequences of trade policy, and analyzes the consequences of immigration and foreign direct investment. Students taking graduate version complete additional assignments.

*A. Costinot***14.540 International Trade (New)**

Subject meets with 14.54

Prereq: 14.01

G (Fall)

4-0-8 units

Provides an introduction to theoretical and empirical topics in international trade. Offers a brief history of globalization. Introduces the theory of comparative advantage and discusses its implications for international specialization and wage inequality. Studies the determinants and consequences of trade policy, and analyzes the consequences of immigration and foreign direct investment. Students taking graduate version complete additional assignments.

*A. Costinot***14.581 International Economics I**

Prereq: 14.04

G (Fall)

5-0-7 units

Covers a variety of topics, both theoretical and empirical, in international trade, international macroeconomics, and economic geography. Focuses on general equilibrium analysis in neoclassical economies. Considers why countries and regions trade, and what goods they trade; impediments to trade, and why some countries deliberately erect policy to impede; and implications of openness for growth. Also tackles normative issues, such as whether trade openness is beneficial, whether there are winners and losers from trade and, if so, how they can possibly be identified.

*A. Costinot, D. Donaldson***14.582 International Economics II**

Prereq: 14.06

G (Spring)

5-0-7 units

Building on topics covered in 14.581, revisits a number of core questions in international trade, international macroeconomics, and economic geography in the presence of increasing returns, imperfect competition, and other distortions. Stresses their connection to both macro and micro (firm-level) data for questions related to trade policy, inequality, industrial policy, growth, and the location of economic activities. Focuses on both theoretical models, empirical findings, and the challenging task of putting those two together.

D. Atkin, A. Costinot

Labor Economics and Industrial Relations

14.64 Labor Economics and Public Policy

Subject meets with 14.640

Prereq: 14.30 or permission of instructor

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: U (Fall)

4-0-8 units. HASS-S

Provides an introduction to the labor market, how it functions, and the important role it plays in people's lives. Topics include supply and demand, minimum wages, labor market effects of social insurance and welfare programs, the collective bargaining relationship, discrimination, human capital, and unemployment. Completion of or concurrent enrollment in 14.03 or 14.04, and 14.32 recommended. Students taking graduate version complete additional assignments.

J. Angrist

14.640 Labor Economics and Public Policy

Subject meets with 14.64

Prereq: 14.300 or permission of instructor

Acad Year 2022-2023: Not offered

Acad Year 2023-2024: G (Fall)

4-0-8 units

Provides an introduction to the labor market, how it functions, and the important role it plays in people's lives. Topics include supply and demand, minimum wages, labor market effects of social insurance and welfare programs, the collective bargaining relationship, discrimination, human capital, and unemployment. Completion of or concurrent enrollment in 14.03 or 14.04, and 14.32 recommended. Students taking graduate version complete additional assignments.

J. Angrist

14.661 Labor Economics I

Subject meets with 14.661A

Prereq: 14.32 and (14.03 or 14.04)

G (Fall)

5-0-7 units

A systematic development of the theory of labor supply, labor demand, and human capital. Topics include wage and employment determination, turnover, search, immigration, unemployment, equalizing differences, and institutions in the labor market. Particular emphasis on the interaction between theoretical and empirical modeling. No listeners.

D. Acemoglu, J. Angrist, P. Pathak

14.661A Labor Economics I

Subject meets with 14.661

Prereq: 14.32 and (14.03 or 14.04)

G (Fall)

5-0-7 units

Covers the same material as 14.661 but in greater depth. Additional assignments required. Limited to economics PhD students who wish to declare a major field in labor economics.

D. Acemoglu, J. Angrist, P. Pathak

14.662 Labor Economics II

Subject meets with 14.662A

Prereq: 14.32 and (14.03 or 14.04)

G (Spring)

5-0-7 units

Theory and evidence on the determinants of earnings levels, inequality, intergenerational mobility, skill demands, and employment structure. Particular focus on the determinants of worker- and firm-level productivity; and the roles played by supply, demand, institutions, technology and trade in the evolving distribution of income.

D. Autor, S. Jaeger

14.662A Labor Economics II

Subject meets with 14.662

Prereq: 14.32 and (14.03 or 14.04)

G (Spring)

5-0-7 units

Covers the same material as 14.662 but in greater depth. Additional assignments required. Limited to economics PhD students who wish to declare a major field in labor economics.

D. Autor, S. Jaeger

Economic History

14.70[J] Medieval Economic History in Comparative Perspective

Same subject as 21H.134[J]

Prereq: None

U (Spring)

3-0-9 units. HASS-S; CI-H

See description under subject 21H.134[J].

A. McCants

14.73 The Challenge of World Poverty

Prereq: None

U (Fall)

4-0-8 units. HASS-S; CI-H

Designed for students who are interested in the challenge posed by massive and persistent world poverty. Examines extreme poverty over time to see if it is no longer a threat, why some countries grow fast and others fall further behind, if growth or foreign aid help the poor, what we can do about corruption, if markets or NGOs should be left to deal with poverty, where to intervene, and how to deal with the disease burden and improve schools.

*E. Duflo, F. Schilbach***Economic Development****14.74 Foundations of Development Policy**

Subject meets with 14.740

Prereq: 14.01

U (Fall)

Not offered regularly; consult department

4-0-8 units. HASS-S

Explores the foundations of policy making in developing countries, with the goal of spelling out various policy options and quantifying the trade-offs between them. Topics include education, health, fertility, adoption of technological innovations, financial markets (credit, savings, and insurance), markets for land and labor, political factors, and international considerations (aid, trade, and multinational firms). Some basic familiarity with probability and/or statistics is useful for this class. Students taking graduate version complete additional assignments.

*Consult Department Headquarters***14.740 Foundations of Development Policy**

Subject meets with 14.74

Prereq: 14.01

G (Fall)

Not offered regularly; consult department

4-0-8 units

Explores the foundations of policy making in developing countries, with the goal of spelling out various policy options and quantifying the trade-offs between them. Topics include education, health, fertility, adoption of technological innovations, financial markets (credit, savings, and insurance), markets for land and labor, political factors, and international considerations (aid, trade, and multinational firms). Some basic familiarity with probability and/or statistics is useful for this class. Students taking graduate version complete additional assignments.

*Consult Department Headquarters***14.75 Political Economy and Economic Development**

Subject meets with 14.750

Prereq: 14.01

U (Spring)

4-0-8 units. HASS-S

Explores the relationship between political institutions and economic development, covering key theoretical issues as well as recent empirical evidence. Topics include corruption, voting, vote buying, the media, and war. Discusses not just what we know on these topics, but how we know it, covering how to craft a good empirical study or field experiment and how to discriminate between reliable and unreliable evidence. Some basic familiarity with probability and/or statistics is useful for this class. Students taking graduate version complete additional assignments.

*A. Banerjee, B. Olken***14.750 Political Economy and Economic Development**

Subject meets with 14.75

Prereq: 14.01

G (Spring)

4-0-8 units

Explores the relationship between political institutions and economic development, covering key theoretical issues as well as recent empirical evidence. Topics include corruption, voting, vote buying, the media, and war. Discusses not just what we know on these topics, but how we know it, covering how to craft a good empirical study or field experiment and how to discriminate between reliable and unreliable evidence. Some basic familiarity with probability and/or statistics is useful for this class. Students taking graduate version complete additional assignments.

*A. Banerjee, B. Olken***14.76 Firms, Markets, Trade and Growth**

Subject meets with 14.760

Prereq: 14.01 and (14.30 or permission of instructor)

U (Spring)

4-0-8 units. HASS-S

Examines how industrial development and international trade have brought about rapid growth and large-scale reductions in poverty for some developing countries, while globalization has simply increased inequality and brought little growth for others. Also considers why, in yet other developing countries, firms remain small-scale and have not integrated with global supply chains. Draws on both theoretical models and empirical evidence to better understand the reasons for these very different experiences and implications for policy. Students taking graduate version complete additional assignments.

D. Atkin, D. Donaldson

14.760 Firms, Markets, Trade and Growth

Subject meets with 14.76

Prereq: 14.01 and (14.30 or permission of instructor)

G (Spring)

4-0-8 units

Examines how industrial development and international trade have brought about rapid growth and large-scale reductions in poverty for some developing countries, while globalization has simply increased inequality and brought little growth for others. Also considers why, in yet other developing countries, firms remain small-scale and have not integrated with global supply chains. Draws on both theoretical models and empirical evidence to better understand the reasons for these very different experiences and implications for policy. Students taking graduate version complete additional assignments.

D. Atkin, D. Donaldson

14.770 Introduction to Collective Choice and Political Economy

Prereq: None

G (Fall)

4-0-8 units

Broad introduction to political economy. Covers topics from social choice theory to political agency models, including theories of voter turnout and comparison of political institutions.

D. Acemoglu, B. Olken

14.771 Development Economics: Microeconomic Issues

Prereq: 14.121 and 14.122

G (Fall)

5-0-7 units

A rigorous introduction to core micro-economic issues in economic development, focusing on both key theoretical contributions and empirical applications to understand both why some countries are poor and on how markets function differently in poor economies. Topics include human capital (education and health); labor markets; credit markets; land markets; firms; and the role of the public sector.

E. Duflo, B. Olken

14.772 Development Economics: Macroeconomics

Prereq: 14.121 and 14.451

G (Spring)

5-0-7 units

Dynamic models of growth and development emphasizing migration, modernization, risk and finance, and technological change; static and dynamic models of political economy; the dynamics of income distribution and institutional change; SME and larger firm structure in developing countries; development, transparency, and information systems; and functioning of financial markets and institutions in emerging markets, their design and regulation.

D. Atkins, A. Banerjee, R. Townsend

14.773 Political Economy: Institutions and Development

Prereq: 14.121 and 14.451

G (Spring)

5-0-7 units

Economists and policymakers increasingly realize the importance of political institutions in shaping economic performance, especially in the context of understanding economic development. Work on the determinants of economic policies and institutions is in its infancy, but is growing rapidly. Subject provides an introduction to this area. Topics covered: the economic role of institutions; the effects of social conflict and class conflict on economic development; political economic determinants of macro policies; political development; theories of income distribution and distributional conflict; the efficiency effects of distributional conflict; the causes and consequences of corruption; the role of colonial history; and others. Both theoretical and empirical approaches discussed. Subject can be taken either as part of the Development Economics or the Positive Political Economy fields.

D. Acemoglu, A. Banerjee

14.78[J] Shaping the Future of Technology: From Early Agriculture to Artificial Intelligence (New)

Same subject as 15.238[J]

Prereq: None

U (Spring)

4-0-8 units. HASS-S; CI-H

Provides a framework for thinking about major technological transitions over the past 12,000 years as a means to explore paths to a better future. Discusses who gains or loses from innovation and who can shape the future of artificial intelligence, biotech, and other breakthroughs. Introduces major questions tackled by researchers and relevant to economic policy through faculty lectures, interactive events with prominent guests, and group work. Instruction and practice in oral and written communication provided.

D. Acemoglu, S. Johnson

14.THG Graduate Thesis

Prereq: Permission of instructor

G (Fall, IAP, Spring, Summer)

Units arranged

Can be repeated for credit.

Program of research and writing of thesis; to be arranged by the student with supervising committee.

Staff

14.THU Thesis

Prereq: 14.33

U (Fall, IAP, Spring, Summer)

Units arranged

Can be repeated for credit.

Program of research and writing of thesis.

Staff

14.UR Undergraduate Research

Prereq: 14.02

U (Fall, IAP, Spring, Summer)

Units arranged [P/D/F]

Can be repeated for credit.

Participation in research with an individual faculty member or research group, independent research or study under the guidance of a faculty member. Admission by arrangement with individual faculty member.

Consult D. Donaldson

14.URG Undergraduate Research

Prereq: 14.02

U (Fall, IAP, Spring, Summer)

Units arranged

Can be repeated for credit.

Participation in research with an individual faculty member or research group, independent research or study under the guidance of a faculty member. Admission by arrangement with individual faculty member.

Consult D. Donaldson